Discovery Digest

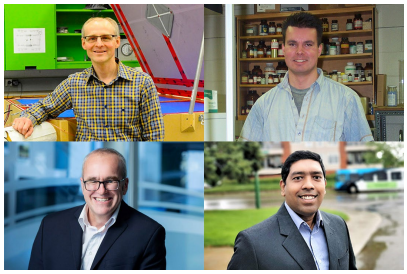
BE WHAT THE WORLD NEEDS

September 2021 - Issue 44

In this issue: USask researchers map new pathways to fight aggressive cancers, a food security research team uses synchrotron technology to image live plants for the first time, water security experts discover the largest store of water on the planet, and much more!

Every month, USask Research Profile and Impact highlights research from across campus. *Discovery Digest* is a glimpse into how USask research, scholarly and artistic work is making a difference for Saskatchewan, Canada, and the world. Feedback welcome!

Top Stories



USask, City of Saskatoon join forces on practical research

Four projects focused on improving life for Saskatoon residents will move forward thanks to Research Junction, an innovative partnership between the City of Saskatoon and USask. Research Junction enables researcher access to city resources, data and expertise, and provides city staff with analysis and data to inform decision-making.

The partnership also provides hands-on learning and research initiatives that allow USask students and post-doctoral fellows to gain relevant career experience, while exploring city-wide concerns such as environmental protection and quality of life for residents.

The projects will be carried out now until early 2023 with a combined total of $100,000 in funding. **The full story including project descriptions**.

USask researchers, Ovarian Cancer Canada and Province of Saskatchewan team up to improve testing and treatment options

A USask project led by College of Medicine researcher Dr. **Laura Hopkins** (MD) will create the province's only tumour bank and—for the first time in Canada—offer ovarian cancer patients testing to learn if

biologic drugs can control their illness.

An ovarian cancer tumour bank—with samples linked to clinical data such as chemotherapy history and disease outcomes of anonymized patients—is essential for future research in gynecological oncology.

The project is one of four proposals by USask researchers awarded a total $837,000 over three years. The Saskatchewan government provided the funding through Ovarian Cancer Canada's OvCAN research initiative. **The full story.**

COVID-19 Research

Saskatoon couple donates $1 million to VIDO to enhance ground-breaking vaccine research

Malcolm and Marilyn Leggett have long recognized the importance the Vaccine and Infectious Disease Organization (VIDO) at USask has on the local community.

Awareness of VIDO's pivotal role compelled the Saskatoon couple to donate $1 million to help establish VIDO as Canada's Centre for Pandemic Research and advance its ground-breaking research on infectious diseases, including COVID-19. They know their support will go a long way to helping others, not just locally, but wherever vaccines are needed around the world. **The full story**.

COVID-19 Research

USask researchers in a wide range of fields are undertaking critical research to help combat COVID-19. Read other stories.

Health research

USask research team finds new potential path to combat aggressive cancers

By targeting certain genes that regulate acid levels and iron content in cancer cells, USask oncology researcher, Dr. **Franco Vizeacoumar** (PhD), and his research team have found a new, more efficient way to kill cancer cells deprived of oxygen in solid cancer tumours.

By targeting and inhibiting the genes of a particular enzyme responsible for protecting and keeping tumours alive, the research team found that the metabolism of the cancer cells can be disrupted, rupturing their membranes and killing them.

The discovery may lead to the design of new, effective therapies that can overcome cancer drug resistance. **The article in *Science Advances*. The full story**.

Virtual technology driving beneficial change in medicine

for isolated communities

USask School of Rehabilitation Science researcher, Dr. **Stacey Lovo** (PhD), has been conducting research in remote communities to determine how best to use virtual technology to address the issue of accessibility to medical and rehabilitative services.

Using robot technology from the USask Department of Surgery can allow patients in remote communities to visit medical facilities in a similar manner to in-person visits, and may ultimately improve health outcomes.

Over the next two years, Lovo plans to assess 120 patients with chronic back pain and musculoskeletal disorders in remote communities and their experiences with physiotherapist and pharmacist telehealth visits. **The full article**.

USask research team aims to predict aging-related diseases, Alzheimer's disease

A USask research team is investigating a gene variant that could be used as a blood test marker to anticipate aging diseases, such as Alzheimer's disease, diabetes and cancer.

A shortened version of the PSEN1 gene appears to lead to cell aging and may be the reason why some individuals appear to age faster than others. Researching this gene variant may lead to a better understanding of why certain individuals develop age-related diseases, and could aid in the development of tools to slow the aging process.

The research work is being conducted by a multidisciplinary team from the USask College of Medicine, the College Agriculture and Bioresources and the Western College of Veterinary Medicine. **The full story**.

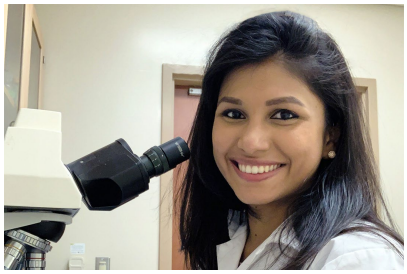
USask research discovers that concussion recovery times may be longer than previously known

A College of Medicine research team, including senior scientist Dr. **Changiz Taghibiglou** (PharmD, PhD) and molecular imaging scientist Dr. **Humphrey Fonge** (PhD), has found a link between concussions and brain insulin resistance.

The findings indicate that mice with mild concussions showed a significant reduction in brain glucose uptake following the injury, which typically took seven days to return to normal. In more severe cases of concussion, damage was sustained for up to four or more weeks.

The study hopes to create public awareness that avoiding activity post-concussion is important for recovery, and may lead to new treatment possibilities such as medications

or diets to treat concussion symptoms. **The full story**.



USask researcher uses innovative imaging techniques to determine blood clot composition

USask College of Medicine graduate researcher, **Vedashree Meher,** used synchrotron-based imaging techniques to examine what blood clots are made of, and how their composition could potentially affect stroke treatment options and patient outcomes.

The research findings could have important implications for post-stroke patients and for those with cases of blood clot formation following COVID-19 immunization.

Meher's research was supervised by Dr. **Roland Auer** (MD, PhD), Dr. **Lissa Peeling** (MD) and Dr. **Michael Kelly** (MD, PhD), and in conjunction with the Canadian Light Source and Stanford University Synchrotron Radiation Lightsource. **The full story.**

Animal health

Animal health and agricultural research highlighted at LFCE summer field day

After a one-year hiatus, the annual Summer Field Day at USask's Livestock and Forage Centre of Excellence took place earlier this summer on July 20. Presentations about LFCE's cutting-edge agricultural and animal health research activities were given throughout the day.

Projects outlined included Dr. **Gregg Adams** (PhD) and his use of genetic technology to enhance agricultural sustainability; Dr. **Bart Lardner**'s (PhD) research on forage characteristics and animal grazing behaviours; and Dr. **Greg Penner**'s (PhD) ongoing work focused on the impacts of water quality on cattle.

For more project summaries, presentation videos and an overview of LFCE's Summer Field Day events, read **the full story**. **Access drought resources.**

Food security research

First-of-its-kind project images live plants for more nutrient-efficient crop breeding

A cutting-edge project is using laser synchrotron technology to image live plants and allow for more efficient crop breeding. The project is being co-led by Dr. **Brian Ham** (PhD) of USask's Global Institute for Food Security and Dr. **Jean Claude Kieffer** (PhD) at the Institut national de la recherche scientifique in Quebec.

The team will use real-time imaging with a specially designed semi-portable source of synchrotron radiation—which provides a brilliant light source that can show materials at the molecular level—to analyze how a plant mobilizes and redistributes key minerals to survive under nutrient-limiting stress conditions.

The goal of the project is to develop more efficient plants with better nutrient uptake and distribution. **The full story**.

USask researcher seeks to minimize loss of fresh fruit and vegetables

USask engineering PhD candidate, **Nazanin Charchi**, res earch team are investigating how to minimize losses of fruits and vegetables by regulating emissions of ethylene in controlled agricultural environments.

Although ethylene is used as a growth and ripening hormone in greenhouses and growth chambers, too much exposure causes damage to produce and results in high carbon emissions. Charchi's team is working to build an ethylene removal process that can purify the air surrounding fresh food that is exposed to and emitting ethylene.

Charchi's work is supervised by Dr. **Jafar Soltan** (PhD), professor of engineering, and Dr. **Ning Chen** (PhD), a scientist at Canadian Light Source. **The full story.**

Water security research

Deep water: Researchers find more below than previously thought

More water lies within the Earth's continental crust than previously thought, according to new estimates published in the journal ***Geophysical Research Letters***. Findings indicate the planet's land mass groundwater is the largest store of water in any form – even larger than ice sheets.

The research was led by Dr. **Grant Ferguson** (PhD), USask professor of engineering, and his co-authors, an international and interdisciplinary group of scientists studying the earth's subsurface biosphere.

The examination of deep groundwater reservoirs has implications for a wide array of challenges such as better understanding the origin of life on Earth, the search for life on Mars, and the practicalities of underground nuclear waste storage. **The full publication. The full story**.

USask researchers warn of increased water demand on the South Saskatchewan River Basin

As farmers adopt high-tech irrigation systems to manage water use, USask water security researchers, including

PhD candidate **Mohammad Ghoreishi**, suggest policymakers should enact measures to curb an "agricultural rebound phenomenon" that increases water demand over time. Increasing demand for water can contribute to drought conditions and impact water flow levels in other regions.

The researchers created a complex socio-hydrological agent-based model that integrates socio-economic and hydrological factors in agricultural systems to explain the agricultural rebound phenomenon, considering profit maximization and personal interactions between farmers that factor into their decision-making.

The study has been published in the *Journal of Hydrology*. **The full publication. The full story**.

USask PhD student seeks to better design agricultural drainage projects as farmers face more extreme precipitation

An award-winning graduate student in the USask College of Arts and Science, **Holly Annand**, is focused on improving human understanding of agricultural drainage and climate change on streamflow in the Canadian Prairies.

The research involves analyzing Prairie wetlands, and the effects of precipitation and agricultural drainage on flooding and infrastructure damage. The study seeks to find a balance between wetland retention and agricultural productivity.

Annand is conducting her doctoral research under the supervision of Dr. **John Pomeroy**(PhD), Canada Research Chair in Water Resources and Climate Change, faculty member in the Department of Geography and Planning, and director of the **Centre for Hydrology**. **The full story**.

USask researcher explores water economy on the Prairies

USask PhD candidate **Leila Eamen** and her research team, including supervisor Dr. **Saman Razavi** (PhD), have developed a hydro-economic model that investigates alternative ways to allocate water resources from the Saskatchewan River Basin that maximizes economic benefits.

The model will estimate the amount of water available in the river basin and how it should be shared among users to best support the economy. It will consider important influences such as climate change and population growth and their effects on water allocation

decisions.

Making these determinations is a critical step to ensuring the security of water resources as supply levels change. **The full story.**

Arts, science, and humanities

USask researcher investigates public attitudes towards reconciliation in Canadian schools

Sociology researcher, Dr. **Terry Wotherspoon** (PhD), hopes to shed light on public attitudes regarding the incorporation of reconciliation initiatives in Canadian school curricula. The research is conducted in partnership with Dr. **Emily Milne** (PhD) from MacEwan University.

In a recent study published in the *Canadian Review of Sociology*, members of the public in Saskatchewan and Alberta were surveyed regarding their awareness of Indigenous learning initiatives in schools and their opinions on their necessity and effectiveness.

The research team's goal is to inform policymakers and educational administrators of the public understanding of the role of schools and education in reconciliation efforts. **Read the full publication.**

New era for quantum computing possible thanks to warped crystals

USask mathematician Dr. **Steven Rayan** (PhD) and University of Alberta physicist Dr. **Joseph Maciejko** (PhD) have developed a whole new theory of quantum material, based on a non-standard geometry called hyperbolic geometry.

Published in *Science Advances*, the work points to the possibility of developing a larger class of quantum materials than previously known, opening the door for wider technological advancements, such as the development supercomputers that can quickly analyze and solve complex data problems.

Rayan said this capability is particularly valuable in designing vaccines and drugs, and applications such as smaller, less expensive, and more accurate MRI technologies for use in remote areas or in harsh environments. **The full story.**

Undergraduate research

Award-winning USask history student returns to post-secondary students after more than 50 years

Sarah Trevor has entered the USask College of Arts and

Science to pursue a Bachelor of Arts (Honours) degree in history after five decades away from post-secondary studies.

After growing up in Zimbabwe, Trevor combined her first year of a Bachelor of Arts degree at the University of Cape Town with a library diploma, and then left university for mining camps in Africa and Canada. With an interest in research and having found tremendous support for her return to studies at USask, Trevor plans to complete her undergraduate degree and then apply to graduate school.

Trevor was selected as the recipient of the Ruth and Eber Pollard Scholarship in History and the Simpson Prize in History in the 2020-21 academic year for undergraduate excellence in history. **The full story.**

Accolades

USask moves up to #15 in global institution rankings for water resources, #1 in Canada

USask has risen five spots to #15 in the global Shanghai rankings for institutions conducting water resources research. With the Global Institute for Water Security (GIWS) at the University of Saskatchewan, and world-class research teams working at its helm, USask maintains its spot as #1 in Canada.

Directed by Dr. **Jay Famiglietti** (PhD), GIWS is renowned for researching, developing and innovating tools to protect the world's water supply, with one of the strongest interdisciplinary water research communities in the world.

Being a leader in the management of water resources is increasingly important as environmental changes affect the world's natural water supply. **See the full ranking list here.**

Canadian Academy of Health Sciences inducts USask researchers

Three USask leaders and researchers have been inducted as fellows into the Canadian Academy of Health Sciences: Dr. **Volker Gerdts** (DVM, PhD), Dr. **Walter Siqueira** (DDS, PhD) and Dr. **Cheryl Waldner** (DVM, PhD).

The Canadian Academy of Health Sciences (CAHS) is one of three national academies that comprise the Council of Canadian Academies, the highest honour granted to scholars in Canada. (The other two CCA academies are the Royal Society of Canada and the Canadian Academy of Engineering.) Fellows of the

Academy are elected based on their demonstrated leadership, creativity, distinctive competencies and commitment to advancing academic health sciences.

The new fellows were inducted on Sept. 13. **The full story**.

USask researcher named a fellow of the Royal Society of Canada

USask researcher and professor of community health and epidemiology, Dr. **Malcolm King** (PhD), was named a fellow of the Royal Society of Canada (RSC) on Sept. 7—one of 89 new fellows elected by their peers for their outstanding scholarly, scientific and artistic achievement.

King was trained as a polymer chemist and has contributed substantially to the establishment of the Canadian Institutes of Health Research ethical principles for Indigenous health research and the study of respiratory medicine, including the aerosol spread of COVID-19.

Recognition by the RSC for career achievement is the highest honour an individual can achieve in Canada in the arts, social sciences, and sciences. **Watch a short video. The full story.**

GWF Director awarded lifetime hydrology research award

Dr. **John Pomeroy** (PhD), USask Distinguished Professor, Canada Research Chair in Water Resources and Climate Change, and Director of the pan-Canadian Global Water Futures program has been named the 2021 Walter Langbein Lecturer by the American Geophysical Union.

This award is presented annually by America Geophysical Union's Hydrology Section. It recognizes the lifetime contributions of a senior scientist to the science of hydrology or unselfish cooperation in hydrologic research.

The lecture will take place December 13-17 happening both online and in-person in New Orleans, USA. **The full story.**

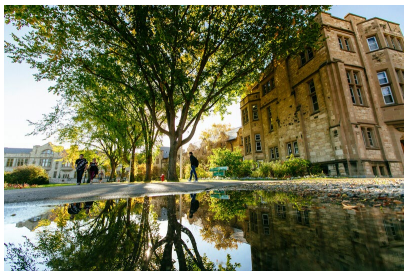
From the OVPR

Signature Areas Renewal Update – Attend the Pitch Sessions

Since May 2021, the Office of the Vice-President Research and Office of the Provost and Vice-President Academic have been leading a process to renew the university's signature areas of research.

The USask community is invited to attend online "pitch" sessions on new/revised signature areas. A total of 16 pitches were received. Full information on the pitches, the executive summary for each, and schedule for pitch presentations can be found on the Signature Areas Renewal SharePoint site (NSID required for access).

The pitch sessions will be recorded and posted on the site as they are completed. There will also be opportunity for feedback from USask community members on all the sessions. **Check the Signature Areas Renewal website for further details**.



Associate Vice-President Research Search Process

The Office of the Vice-President Research is recruiting two Associate Vice-President(s) Research!

All members of the university community were invited to attend public presentations by five shortlisted candidates during the week of September 7, 2021. **Recordings of the public presentations can be viewed online**, and feedback on each candidate can be submitting by completing an **online feedback form**.

All feedback must be received by 12:00 PM on Friday September 24, 2021 to be considered by the Associate Vice-President Research Search Committee. Comments or questions can be directed to **Christopher Martin**.

Telling your research story

Follow USask Research Profile & Impact on LinkedIn

Follow the USask Research Profile and Impact page to stay in the know, with exciting research news delivered right to your LinkedIn newsfeed. As a unit of the Office of the Vice-President Research, our mission is to help share USask research stories with the world.

We will be sharing current research, exciting findings, new research directions and partnerships regularly. Come see what we're up to at USask by making us part of your professional network, and check back often for updates.

Share your research story on social media

Use the hashtag **#USaskResearch** when sharing about USask-related research findings, publications or achievements on social media. Using our hashtag will allow OVPR and USask to find your posts and share them on our own channels. You can also search the hashtag at any time to find relevant research-related content. Don't forget to follow **@VPR_USask** and **@USask** on Twitter for

the latest research and university news.

In THE CONVERSATION

Write about your own research in The Conversation

USask is a founding member of The Conversation Canada, an online academic journalism hub/newswire where researchers write plain-language editorials and explainer articles about their research. Articles written by USask researchers have been read more than 2.3 million times since the university entered into a partnership with the SSHRC-funded Conversation Canada in June 2017.

Writing is easier than you think!

Watch a video from Conversation Canada Editor-in-Chief Scott White.

Want to reach a broad audience with your research? Consider pitching an item to the Conversation. **Wondering where to start? Read a short explainer on how to write for The Conversation Canada. Read previous USask articles here** and **get in touch with Research Profile and Impact.**

Upcoming events

anohc kipasikonaw/we rise/niipawii: Installation of the final step - Sept. 21 at 11 am

anohc kipasikônaw/we rise/niipawi is a collaborative art project organized by the College of Arts and Science to celebrate Indigenous knowledge systems. Over the course of 13 moons, 13 carved stone steps are being installed at the Snelgrove Gallery. The steps, reclaimed from a slate staircase in the Thorvaldson Building on campus, have been hand-carved with Cree syllabics representing the traditional names of the 13 moons. The collaboration is led by artists **Lyndon Tootoosis,** Dr. **Sandy Bonny** (PhD) and **Vanessa Hyggen.**

On Sept. 21, the last of the steps will be installed. An event will be held at Gordon Snelgrove Gallery on the USask campus at 11 am. **The event will also be livestreamed on**

Facebook.

Country Conversations: Experience the World from Your Campus Community – Sept. 22 at 1 pm

"Country Conversations" is an exciting series of global dialogue which aims to unite our campus community and encourage global learning from our faculty who have in-depth experience working with select countries and communities. USask faculty and staff are cordially invited to the first event featuring Japan.

The panel will be moderated by Dr. **Carin Holroyd** (PhD), professor of political studies, College of Arts and Science. The three panelists are: Dr. **Chary Rangacharyulu** (PhD) – professor, Department of Physics and Engineering Physics, College of Arts and Science; Dr. **Jaswant Singh** (PhD) – professor, Department of Veterinary Biomedical Sciences, Western College of Veterinary Medicine; Dr. **Karen Tanino** (PhD) – professor, Department of Plant Sciences, College of Agriculture and Bioresources.

RSVP is required. Register **here** if you would like to attend. For more information, please contact **international.office@usask.ca**.

Nuit Blanche Eve Augmented Reality Tour at USask - Sept. 24 at 4-7 pm

The Department of Art and Art History in the College of Arts and Science at USask will host an augmented reality (AR) tour on the USask campus, through a partnership with Nuit Blanche Saskatoon and the Shared Spaces project.

This all-ages contemporary art event will feature 16 AR artworks created by 12 USask students: **Alleah Bowring, Gabrielle Da Silva, Eva Francis-Work, Jesse Fulcher Gagnon, Rod Goertzen, Elizabeth Laidlaw, Danya Lawton, Chantelle Matkowski, Athena Ni, Leanne Read, Milzedrich Salcedo**, and **Ming Zhang**.

Please note that the AR tour will only be accessible by downloading the Shared Spaces app on an electronic device. Please visit the Shared Spaces website for **more information about the app and the artists' projects**. A **map of the artworks** is also available.

Breakthroughs in Water Security Research - Distinguished Lecture Series - Sept. 15-Nov. 3

Starting September 15th, The Global Institute for Water Security and Global Water Futures are proud to present **a weekly virtual seminar series** featuring top water experts from around the world. These lectures are free and open to all.

More information and registration.

2021 Wîcihitowin Indigenous Engagement Conference – Oct. 5-7

The Johnson Shoyama Graduate School of Public Policy is proud to be an organizing partner in the annual Wîcihitowin Indigenous Engagement Conference, alongside the City of Saskatoon, United Way Saskatoon & Area, Saskatoon Public Library, and the Saskatchewan Health Authority.

This ree online conference will take place October 5 to 7, 2021, and will expSeven Sacred Teachings that guide Indi genous People's ways of knowing. Join us and learn from a fantastic lineup of Knowledge Keepers and Residential School Survivors about how these teachings can inform, heal, and support communities, organizations, governments, and businesses on their paths to reconciliACTION.

Visit **https://wicihitowin.ca** to see the lineup of speakers and register to attend.

P²IRC Symposium - Oct. 20-21

The 6th annual P²IRC Symposium will take place October 20-21 online. Hosted by the **Global Institute for Food Security** (GIFS) at the University of Saskatchewan, the 2021 event is once again free to attend.

Recorded presentations from a diverse program of speakers will be brought to life with live Q&A sessions, while dedicated networking rooms will provide attendees a chance to engage with world-renowned researchers, industry representatives, students and others in-between sessions.

The event will also feature the 6th annual P²IRC Student Poster Competition, as well as an in-person networking event in Saskatoon. **Click here to register.**

Global Institute for Food Security (GIFS) Presents: Engineering Biology Speaker Series - ongoing

The Global Institute for Food Security (GIFS) is pleased to present an exciting, informative and educative webinar series that will answer important questions about the scope and impact of Engineering Biology (also termed 'biomanufacturing').

This six-part series will feature renowned experts from across North America sharing insights into this field that's impacting numerous sectors including agriculture, alternative foods, health and medicine, and biomaterials. The series will run in six-hourly editions over the fall, starting on September 1, 2021. **Click here to register.**

In the news

- The month's top stories:
    - **Deep Water: Researchers find more below than previously thought**, featured by Education News Canada, Water Canada, and Smart Water Magazine, and seen by an estimated 8.3 million people
    - **Research reveals extraordinary rates of rare neuromuscular disorder in Indigenous people in Saskatchewan**, featured by the Saskatoon StarPhoenix, CTV News, and Education News Canada, and seen by 540,000
    - **First-of-its-kind project at the Global Institute for Food Security imaging live plants for more nutrient-efficient crop breeding**, featured by MSN News Canada, Global News, and Germination Online, and seen by an estimated 72,000
- USask's COVID-19 research has been featured in:
    - Aug. 10 - Crooked Podcast: **Delta, Delta, Delta with Dr. Angie Rasmussen | Crooked Media**
    - Aug. 16 - STAT News - **Research sheds light on how safe vaccinated people are from Covid-19 (statnews.com)**
    - Aug. 22 - The New Yorker - **Have you already had a breakthrough COVID infection?**
    - Aug. 24 - CBC - **3 key factors in how Canada will fare during the 4th wave of COVID-19 | CBC News**
    - Aug. 27 - Saskatoon StarPhoenix - **'This is far bigger than one vaccine': Saskatoon couple donates $1 million to VIDO**
    - Aug. 27 - Global News - **VIDO receives $1M funding boost from Saskatoon couple**
    - Aug. 29 - CTV News - **Saskatoon couple donates $1M to Sask. vaccine and infectious disease research centre**
    - Aug. 31 - Healthy Debate: **COVID-19 and animal populations**
    - Sept. 3 - CBC - **VIDO virologist explains COVID-19 vaccine protections, need for booster shots and more**
    - Sept. 10 - National Geographic - **Why it's so tricky to trace the origin of COVID-19 (nationalgeographic.com)**
- Other USask research has also been featured in:
    - Aug, 18 - PA Now - **“Desperate” wasps becoming more common throughout Saskatchewan**
    - Aug. 18 - 620 CKRM - **USask researchers use high-tech to improve crop breeding**
    - Aug. 19 - Global News **USask researchers use laser diagnostics for crop sustainability**
    - Aug. 23 - Regina Leader-Post - **Higher rates of Kennedy's Disease found in Indigenous peoples: U of S study**
    - Aug. 24 - HortiDaily - **New project imaging live plants for more nutrient-efficient crop breeding**
    - Sept. 7 - 650 CKOM - **RNA load in Saskatoon’s wastewater increases slightly,**

but there are signs of COVID slowdown

- Sept. 9 - The Producer - **Portable synchrotron to assist plant imaging**
- Sept. 12 - 620 CKRM - **USask research into pollinators gets huge boost**
- Sept. 12 - CJWW - **USask researcher named a member of the Royal Society of Canada**

UNIVERSITY OF SASKATCHEWAN

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Looking for past issues of Discovery Digest or Research Update? Visit **Research.usask.ca** for more.

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